



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/017,444	12/14/2001	Timothy A. Thomas	CR00296M	6296
22917	7590	10/12/2005	EXAMINER	
MOTOROLA, INC. 1303 EAST ALGONQUIN ROAD IL01/3RD SCHAUMBURG, IL 60196			WILLIAMS, LAWRENCE B	
			ART UNIT	PAPER NUMBER
			2638	

DATE MAILED: 10/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/017,444

Applicant(s)

THOMAS ET AL.

Examiner

Lawrence B. Williams

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5,8,10,13,15-18,20,21,24,26 and 29 is/are rejected.
- 7) ☒ Claim(s) 4,7,12,14,19,23,28-30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

2. Claims 4, 6-7, 9, 11-12, 14, 19, 22-23, 25, 27-28, and 30 are objected to because of the following informalities: Examiner suggests applicant define all variables in the equations cited. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

4. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 8 recites "repeating limitations" in line 2. It is unclear as to what the phrase is referring to in claim 3. Examiner suggests applicant rewrite the claim to clearly and distinctly claim the subject regarded as the invention.

5. Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 13 recites "repeating limitations" in line 5. It is unclear as to what the

phrase is referring to in claim 12. Examiner suggests applicant rewrite the claim to clearly and distinctly claim the subject regarded as the invention.

6. Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 24 recites "repeating limitations" in line 5. It is unclear as to what the phrase is referring to in claim 3. Examiner suggests applicant rewrite the claim to clearly and distinctly claim the subject regarded as the invention.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 2, 15, 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Mesecher (US Patent 6,115,406).

(1) With regard to claim 1, Mesecher discloses in Fig. 15, a method of operating a transmitter, said method comprising: determining a first unequal weighting of a plurality of stream weights (D_1 - D_N) and transmitting a plurality of transmission signals as a function of a plurality of data streams and the first unequal weighting (318-322) of the plurality of streams weights (col. 6, lines 3-20).

(2) With regard to claim 2, Mesecher also the method of claim 1, further comprising: determining a second unequal weighting of the plurality of stream weights subsequent to the determination of the first unequal weighting for the plurality of stream weights, and transmitting the plurality of transmission signals as a function of the plurality of data streams and the second unequal weighting of the plurality of streams weights (col. 3, line 64-col. 4, line 5; col. 6, lines 3-20).

(3) With regard to claim 15, Mesecher also discloses in Fig. 8, a transmitter, comprising: a module (Fig. 5, element 98) operable to determine a first unequal weighting of a plurality of stream weights, and means (48-52) for transmitting a plurality of transmission signals as a function of a plurality of data streams and the first unequal weighting of the plurality of streams weights.

(4) With regard to claim 16, Mesecher also discloses the transmitter of claim 15, wherein: said module (Fig. 5, element 98) is operable to determine a second unequal weighting of the plurality of stream weights subsequent to the determination of the first unequal weighting for the plurality of stream weights, and the plurality of transmission signals are transmitted as a function of the plurality of data streams and the second unequal weighting of the plurality of streams weights (col. 3, line 64-col. 4, line 5; col. 6, lines 3-20).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2634

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 3, 8, 9 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ketchum et al. (US 6,760,388 B1).

(1) With regard to claim 3, Ketchum et al. discloses a method of operating a transmitter, said method comprising; determining a mean square error for each stream weight of a plurality of stream weights (col. 15, line 53- col. 16, line 43), determining a first stream weight of the plurality of stream weights having the largest mean square error; increasing a power of the first stream weight; and decreasing a power of each stream weight of the plurality of stream weights excluding the first stream weight (col. 6, lines 33-52). Ketchum et al. discloses the water-pouring or water-filling technique. It is well known in the art that according to this technique, data stream capacity can be maximized by increasing power to a stream with a high SNR and reducing power to the low SNR streams.

(2) With regard to claim 8, Ketchum et al. also discloses repeating limitations when all of the mean square errors of the plurality of stream weights are unequal (col. 7, lines 20-38; col. 11, lines 15-18).

(3) With regard to claim 9, though Ketchum et al. does not teach applicant's formula for determining an equal weighting of the plurality of stream weights, such a formula would be a mere design choice of the inventor based on the dynamics of the system involved.

11. Claims 5, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ketchum et al. (US 6,760,388 B1) as applied to claim 3 above, and further in view of Benz et al. (US Patent 6,885,875 B1).

(1) With regard to claim 5, as noted above, Ketchum et al. discloses all limitations of claim 3 above. Ketchum et al. does not however explicitly disclose establishing an increment, wherein an increasing of the power of the first stream weight is by a summation of the power and the increment.

However, Benz et al. discloses that it is known in the art to specify a fixed increment for increasing or reducing transmission power.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teaching of Benz et al with the teachings of Ketchum et al. as a method of improving transmission performance and reducing interference between transmitted and received signals.

(2) With regard to claim 6, though Benz et al. does not explicitly teach a formula for establishing the increment. However such a formula for an increment would be a mere design choice of the inventor of the system based upon the dynamics of the system in design.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teaching of Benz et al with the teachings of Ketchum et al. as a method of improving transmission performance and reducing interference between transmitted and received signals.

12. Claims 10, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mesecher (US Patent 6,115,406) in view of Benz et al. (US Patent 6,885,875 B1).

(1) Mesecher discloses in Fig. 15, a method of operating a transmitter, said method comprising: initializing a first stream weight (col. 6, lines 3-20). Mesecher does not however explicitly disclose increasing the first stream weight by a product of a power variable and an increment, though he does disclose weight adjustment in the receiver (to be used by the transmitting antennas) by using an adaptive algorithm (col. 6, lines 49-56).

However, Benz et al. discloses that it is known to specify a fixed increment for increasing or decreasing power. Though, Benz et al. does not explicitly teach a formula for establishing the increasing, such a formula for an increment would be a mere design choice of the inventor of the system based upon the dynamics of the system in design.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Mesecher with the invention of Benz et al. as a method of controlling power and interference in a communication system.

(2) With regard to claim 11, though, Mesecher does not explicitly teach a formula for initializing the first stream weight, such a formula for an initialization would be a mere design choice of the inventor of the system based upon the dynamics of the system in design.

13. Claims 17-18, 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mesecher (US Patent 6,115,406) as applied to claim 15 above, and further in view of Ketchum et al. (US Patent 6,760,388 B2).

(1) With regard to claim 17, as noted above, Mesecher discloses all limitations of claim 15 above. Mesecher does not however teach wherein to determine the first unequal weighting of the plurality of stream weights, the module is further operable to; determine a mean square error

for each stream weight of a plurality of stream weights, determining a first stream weight of the plurality of stream weights having the largest mean square error; increasing a power of the first stream weight; and decreasing a power of each stream weight of the plurality of stream weights excluding the first stream weight. Ketchum et al. discloses the water-pouring or water-filling technique. It is well known in the art that according to this technique, data stream capacity can be maximized by increasing power to a stream with a high SNR and reducing power to the low SNR streams.

However, Ketchum et al. discloses wherein to determine the first unequal weighting of the plurality of stream weights, a module (Fig. 2, element 226) is further operable to determine a mean square error for each stream weight of a plurality of stream weights (col. 15, line 53- col. 16, line 43), determining a first stream weight of the plurality of stream weights having the largest mean square error; increasing a power of the first stream weight; and decreasing a power of each stream weight of the plurality of stream weights excluding the first stream weight (col. 6, lines 33-52). Ketchum et al. discloses the water-pouring or water-filling technique. It is well known in the art that according to this technique, data stream capacity can be maximized by increasing power to a stream with a high SNR and reducing power to the low SNR streams.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Ketchum et al. with the invention of Mesecher as a method of increasing throughput in a MIMO system.

(2) With regard to claim 18, Ketchum et al. also discloses wherein to establish the first unequal weighting of the plurality of stream weights, the module is further operable to establish a set of statistics corresponding to a channel vector (col. 4, lines 12-31).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Ketchum et al. with the invention of Mesecher as a method of increasing throughput in a MIMO system.

(3) With regard to claim 24, Ketchum et al. also discloses wherein to determine the second unequal weighting of the plurality of stream weights, the module is further operable to repeat limitations when all of the mean square errors of the plurality of stream weights are unequal (col. 7, lines 20-38; col. 11, lines 15-18).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Ketchum et al. with the invention of Mesecher as a method of increasing throughput in a MIMO system.

(4) With regard to claim 25, though Ketchum et al. does not teach applicant's formula for determining an equal weighting of the plurality of stream weights, such a formula would be a mere design choice of the inventor based on the dynamics of the system involved.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Ketchum et al. with the invention of Mesecher as a method of increasing throughput in a MIMO system.

14. Claims 20, 21, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mesecher (US Patent 6,115,406) in view of view of Ketchum et al. (US Patent 6,760,388 B2) as applied to claim 15 above, and further in view of Benz et al. (US Patent 6,885,875 B1).

(1) With regard to claim 20, as noted above the combination of Mesecher and Ketchum et

al. disclose all limitations of claim 15 above. They do not however explicitly teach wherein to determine the first unequal weighting of the plurality of stream weights; the module is further operable to establish an increment, though examiner believes that a predetermined increment in the water-pouring method as disclosed by Ketchum would be obvious.

However, Benz et al. discloses that it is known in the art to specify a fixed increment for increasing or reducing transmission power (col. 1, lines 41-44).

It would have been obvious to one skilled in the art at the time of invention to incorporate the teaching of Benz et al with the teachings of Mesecher in combination with Ketchum et al. as a method of improving transmission performance and reducing interference between transmitted and received signals.

(2) With regard to claim 21, Benz et al. teaches that it is well known in the art to specify a fixed increment fixed increment for increasing or reducing transmission power (col. 1, lines 41-44). From this disclosure the limitation of claim 21 would be obvious.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teaching of Benz et al with the teachings of Mesecher in combination with Ketchum et al. as a method of improving transmission performance and reducing interference between transmitted and received signals.

(3) With regard to claim 22, though Benz et al. does not explicitly teach a formula for establishing the increment. However such a formula for an increment would be a mere design choice of the inventor of the system based upon the dynamics of the system in design.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teaching of Benz et al with the teachings of Ketchum et al. as a method of improving transmission performance and reducing interference between transmitted and received signals.

15. Claims 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mesecher (US Patent 6,115,406) as applied to claim 15 above, and further in view of Benz et al. (US Patent 6,885,875 B1).

(1) With regard to claim 26, as noted above, Mesecher discloses all limitations of claim 15 above. Furthermore, Mesecher discloses in Fig. 15, wherein to determine a first unequal weighting of the plurality of stream weights, the module is further operable to: initialize a first stream weight (col. 6, lines 3-20). Mesecher does not however explicitly disclose increasing the first stream weight by a product of a power variable and an increment, though he does disclose weight adjustment in the receiver (to be used by the transmitting antennas) by using an adaptive algorithm (col. 6, lines 49-56).

However, Benz et al. discloses that it is known to specify a fixed increment for increasing or decreasing power. Though, Benz et al. does not explicitly teach a formula for establishing the increasing, such a formula for an increment would be a mere design choice of the inventor of the system based upon the dynamics of the system in design.

It would have been obvious to one skilled in the art at the time of invention to incorporate the teachings of Mesecher with the invention of Benz et al. as a method of controlling power and interference in a communication system.

(2) With regard to claim 27, though, Mesecher does not explicitly teach a formula for initializing the first stream weight, such a formula for an initialization would be a mere design choice of the inventor of the system based upon the dynamics of the system in design.

Allowable Subject Matter

16. Claims 4, 7, 12, 14, 19, 23, 28-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17. Claim 13 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a.) Carloni et al. discloses in US Patent 6,895,253 B1 Wireless Indoor Communications Using antenna Arrays

b.) Yukitoma et al. discloses in US Patent 6,191,736 B1 Data Communication Apparatus and Data Communication Method.

c.) Falconer discloses in US Patent 5,442,661 Path Gain Estimation in a Receiver.

d.) Kitahara discloses in US Patent 6,678,309 B1 CDMA Base Station System.

e.) Mesecher et al. discloses in US 2001/003866 A1 Interference Cancellation in a Spread Spectrum Communication System.

f.) Hattori et al. discloses in US 2002/0098815 A1 Adaptive array antenna System and Method for Determining Radio Signal Direction of Adaptive array antenna.

g.) Lee et al. discloses in US Patent 6,898,250 B2 Wireless Communication System with Feedback and Method Therefor.

h.) Ishii et al. discloses in US 2002/0041253 A1 Adaptive Antenna Receiving Apparatus.

i.) Derryberry et al. discloses in US Patent 6,728,307 B1 Adaptive Antenna Array with Reduced CDMA Pilot Channel Set.

j.) Sugar et al. disclose in US Patent 6,785,520 B2 System and Method for antenna Diversity Using Equal Power Joint Maximal Ratio Combining.

k.) Sato et al. discloses in US Patent 5,745,858 Base Station Transmitter/Receiver Capable of Varying Composite Directivity of Antennas.

l.) Frank et al. discloses in US 2003/0035469 A1 Linear Minimum Mean Square Error Equalization with Interference Cancellation for Mobile Communication Forward Links Utilizing Orthogonal Codes Covered by Long Pseudorandom Spreading Codes.

m.) Kim et al. discloses in US 2002/0018530 A1 Transmission Antenna Diversity Method, and Base Station Apparatus and Mobile Station Apparatus Therefor in Mobile Communication System.

n.) Kuwahara et al. discloses in US Patent 6,597,678 B1 Radio Communication System Using Adaptive Array Antenna.

Art Unit: 2634

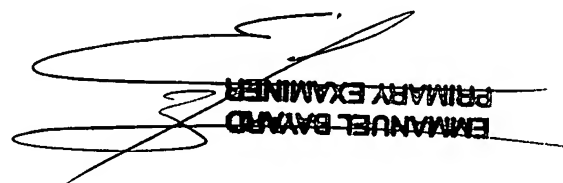
19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on 571-272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence B. Williams

lbw
October 5, 2005


EMMANUEL BAYARD
PRIMARY EXAMINER